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CASE REPORTS

Modified Endodontics for Lengthy Canals

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A review of the dental literature concerning lengths of maxillary cuspids and reports of cuspid gigantism are presented. Endodontic therapy in these cases requires variations and modifications in conventional therapy for successful treatment. A case report is presented which illustrates some of these treatment modifications.

A number of studies and case reports (1–8) have investigated the length of human maxillary cuspids. The mean lengths reported for this tooth have been 26.5 mm by Black (1) and 27.3 mm by Bjorndal et al. (2) Verhoven et al. (3) reported a median value of 26.8 mm for the maxillary cuspid. Case reports (4–6) have indicated lengths of 41 to 52 mm for extracted maxillary cuspids. Venokur and Fink (7) reported the attempted treatment of a maxillary cuspid whose length was estimated to be 41 to 42 mm. They did not present a radiograph showing the tooth obturated. Bellizzi (8) in 1982 documented and reported a case in which the maxillary cuspid was obturated to a working length of 38 mm. These extremely long cuspids present challenges with regard to clinical treatment.

This case report will present the endodontic treatment of a 40-mm maxillary cuspid and discuss the treatment modifications that must be considered to successfully manage such a case.

CASE HISTORY

A 57-yr-old white man presented to the dental clinic with a chief complaint of a "toothache" associated with the maxillary left cuspid. Evaluation by the attending faculty member and dental student resulted in a diagnosis of irreversible pulpitis. An emergency formocresol pulpotomy was performed by the dental student and the patient was referred to the graduate endodontic clinic for assignment and completion of the endodontic treatment.

The patient was then evaluated by an endodontic resident. The medical history was noncontributory. Tooth 11 was asymptomatic and all clinical findings were within normal limits. The periapical radiograph taken at the time of the emergency treatment had failed to capture the total tooth image. A new periapical radiograph (size #2 Kodak film) (Fig. 1) was exposed using a paralleling device (Rinn Corp., Elgin, IL) and the entire tooth length could now be seen. The cuspid measured 40 mm in length on this film. There was a widening of the periodontal ligament space at the apex of the tooth, but no distinct radiolucency was present at that time.

The tooth was anesthetized by infiltrating with 1.5 ml of 2% lidocaine with 1:100,000 epinephrine and single tooth rubber dam isolation was provided. The temporary restoration in the lingual access was removed and the access preparation was refined. The estimated working length was 39 mm, but the longest files available were only 31 mm in length. It was found on this particular tooth that use of a cingulum

FIG 1. Periapical radiograph of tooth 11 taken with a paralleling device. Note difficulty of capturing entire length of this tooth.

FIG 2. Utilization of the cingulum as a reference point for measurements during canal preparation.

reference point would be feasible. By using this lingual reference point (Fig. 2), the overall working length could be reduced by 12 mm and the 31-mm length files would be long enough for the appropriate cleansing and shaping of the root canal system. The working length from this cingulum reference point was established at 27.0 mm (Fig. 3).

The canal was prepared to a master apical file size #60 and the remaining portion of the canal was flared. Flaring with Gates Glidden drills was not effective in this tooth because the handpiece contra-angle head was restricted by the cusp tip. The narrow head of the MM-1500 (Medidenta, Woodside, NY) allowed access to the cingulum reference point. Sonic debridement and flaring was accomplished by using a #40 rispisonic type file for a 1-min duration. Hedstrom files were used and the result was a final flare of approximately a size #100 K file.

Obturation (Fig. 4) was accomplished using a lateral condensation gutta-percha technique and Roth's 811 sealer (Roth International Drug Co., Chicago, IL). The ST-40 spreader (Union Broach, New York, NY) selected was one that would have the length to reach within 1 to 2 mm of the working length. A composite resin was placed in the lingual access.

The 6-month recall revealed no periapical pathosis and the patient has been asymptomatic since treatment was completed (Fig. 5).

DISCUSSION

If the cusp tip had been used as a reference point, the working length would have been 39.0 mm, making the treated canal approximately the same as the 38 mm reported by

FIG 3. Working length radiograph.

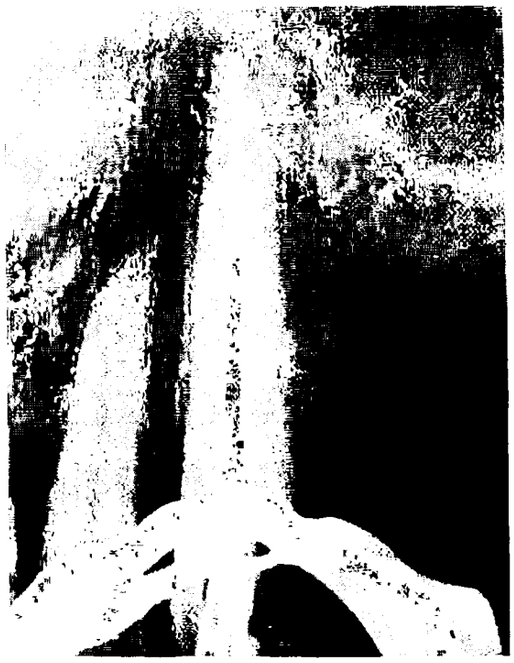

FIG 4. Obturation with gutta-percha (lateral condensation).

Bellizzi (8). In attempting endodontic treatment on teeth of this length, one soon discovers that some modifications must be made in the treatment technique due to restrictions in length of files, endodontic burs, Gates Glidden burs, sonic/ultrasonic instruments, obturating materials, and spreaders. Bellizzi (8) modified the handle portion of D-type files to

FIG 5. Six-month follow-up radiograph.

provide adequate length so the cusp tip could still be used as a reference point. The D files are so infrequently used in today's practice of endodontics that locating a source for this type of file may prove to be so difficult that this may not be a viable treatment option.

The cingulum reference point in this case allowed the use of standardized 31-mm files and the MM-1500 sonic instrument for canal preparation. The master and accessory gutta-percha cones did not have to be customized to provide obturation of the canal and a spreader was available of adequate length and size to reach within 2 mm of the working length. Increasing the vertical angulation of the X-ray tube head allowed the use of standard size #2 radiographic film rather than the longer bite-wing film advocated by Bellizzi (8). Most of the modifications in technique suggested by Bellizzi (8) were not necessary in this case due to the use of the cingulum reference point.

The case reported here demonstrates that extremely long teeth can be successfully treated endodontically if appropriate modifications in treatment are utilized. One appointment treatment is feasible if the appropriate materials and instruments are available.

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